

DELAWARE RIVER BASIN
EAST BRANCH WALLEN PAUPACK CREEK, PIKE COUNTY

MA072238

PENNSYLVANIA

PROMISED LAND DAM

NDI-PA 00308 PA DER 52-12



PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM



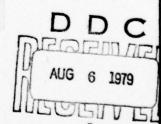
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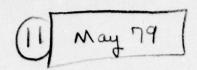
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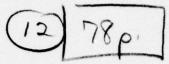
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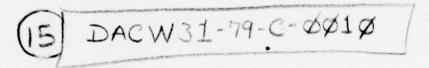
DELAWARE RIVER BASIN



Name of Dam: Promised Land Dam

County and State: Pike County, Pennsylvania

Inventory Number: PA 00308



PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM



Nationa Dam Inspection Program.
Promised Land Dam (NDI-PA ØØ3Ø8, PA
DER 52-12), Delaware River Basin, East
Branch Wallenpaupack Creek, Pike County,
Pennsylvania. Phase I Inspection Report.

Prepared by:

O'BRIEN & GERE ENGINEERS, INC. JUSTIN & COURTNEY DIVISION

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For:

DEPARTMENT OF THE ARMY Baltimore District, Corps of Engineers Baltimore, Maryland 21203

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PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigations, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected, and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The spillway design flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

PHASE I REPORT

NATIONAL DAM INSPECTION PROGRAM

Name of Dam: State Located: County Located: Stream: Coordinates:

Date of Inspection:

Promised Land Dam ID # PA 00308 Pennsylvania Pike East Branch Wallenpaupack Creek Latitude 41⁰ 19.1', Longitude 75⁰ 12.6'

postered

ASSESSMENT

December 6, 1978

Promised Land Dam is an earth embankment approximately 125 feet long with a maximum height of 16 feet. The spillway is a broadcrested weir, approximately 33 feet long, located in the center of the embankment. The reservoir drain system consists of a 48 inch square conduit controlled by means of a stop-log structure. The dam impounds a 422 acre reservoir for recreation within the Promised Land State Park.

Examination of the results of the hydrologic and hydraulic analyses indicates that the spillway is capable of passing 45 percent of the Probable Maximum Flood (PMF) without overtopping the embankment. Since the spillway cannot pass 50 percent of the PMF, which is the Spillway Design Flood (SDF), the spillway system is classified as Inadequate.

Based on visual observations made during the date of the inspection, the dam and its appurtenant structures are considered to be in fair condition. There is a low area at the top of dam near the right abutment, and bulges in the dry stone wall are evident. Seeps exist near the downstream toe on the right side of the dam. A large (50 foot high, 24 inch diameter) tree is adjacent to the downstream toe of the dam on the right side. Riprap protection on the upstream slope is missing. Some concrete surfaces have deteriorated due to spalling.

Recommendations and remedial measures are as follows:

- Detailed analyses should be initiated to determine the stability of the dam and need for structural improvements. Evaluate the significance of the seepage and the cause of discoloration of seepage downstream of the dam to the right of the spillway. The stability analyses and seepage evaluation should be performed by a licensed professional engineer experienced in the design and construction of dams.
- The large tree adjacent to the downstream toe of the right embankment should be cut below ground level and the hole filled and compacted.

- The parking lot should be regraded so that runoff drains away from the dam.
- 4. The stop-logs should be provided with means to facilitate their removal.
- Decisions concerning the need to place riprap protection, fill settled areas, raise the top of dam, and construct additional spillway facilities should await the results of stability analyses and further hydrologic and hydraulic studies.
- Consideration could be given to increasing the capacity of the spillway in accordance with the results of detailed hydrologic and hydraulic studies.

Operation and Maintenance Procedures:

- A warning system should be developed for Promised Land Dam. During periods of heavy rainfall or rapid snowmelt the dam should be monitored and downstream residents alerted in the event of an impending failure.
- The stop-logs should be removed every 6 months to remove sediment that may have been deposited against the stop-logs in the conduit.
- 3. Until the necessary remedial work has been performed and consideration has been given to increasing the spillway capacity based on detailed hydraulic and hydrologic studies, lake levels should be monitored during periods of heavy rain or rapid snowmelt. If during those periods, the lake level rises rapidly, the stop-logs should be removed to minimize the possibility of overtopping the dam.

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Bate: 14 June 1979

MES W. PECK

Colonel, Corps of Engineers

District Engineer



OVERVIEW
PROMISED LAND DAM, PIKE COUNTY, PENNSYLVANIA

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PHASE I REPORT NATIONAL DAM INSPECTION PROGRAM PROMISED LAND DAM NDI I.D. NO. 00308 DER # 52-12

SECTION 1

PROJECT INFORMATION

1.1 General

- Authority. The Dam Inspection Act, Public Law 92-367, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a program of inspection of dams throughout the United States.
- b. Purpose of Inspection. The purpose of this inspection is to evaluate the structural and hydraulic conditions of the Promised Land Dam and to determine if the dam constitutes a hazard to human life or property.

1.2 Description of Project

a. Dam and Appurtenances. (Supplemented by information obtained from the Pennsylvania Department of Environmental Resources (DER), Division of Dam Safety.)

Promised Land Dam is an earth embankment approximately 125 feet long with a maximum height of 16 feet. The dam impounds a reservoir with a volume of 2,554 acre-feet at normal pool level. The top of the dam is 12-14 feet wide; the downstream slope is approximately 0.25 horizontal to 1.0 vertical (0.25H:1V), and the upstream slope is approximately 3H:1V. No information is available concerning the properties of the embankment materials. A dry stone wall (wall built without mortar) is the only visible protection on the downstream slope.

The spillway is a concrete, broad-crested weir that is 33 feet long and 14 feet wide located in the center of the embankment. The discharge flows over the weir and down the dry stone wall to a sloped concrete apron. A wooden footbridge crosses above the weir at the top of the embankment.

The reservoir drain system consists of a conduit controlled by a stop-log structure located on the upstream slope of the left side of the embankment. The conduit is a 48 inch square reinforced concrete section from the outlet to a point 40 feet upstream of the outlet where it becomes a 49 inch square timber section. This section expands to a 72 inch wide by 48 inch high timber section about 23 feet further upstream. The stop-log structure is located approximately 33 feet upstream of the outlet.

- b. Location. Promised Land Dam is located on the East Branch of Wallenpaupak Creek at a point 0.5 mile north of Promised Land, in Greene Township, Pike County, Pennsylvania. The dam site is shown on the USGS Quadrangle entitled "Promised Land, Pennsylvania" at coordinates N 41⁰ 19.1', w 75⁰ 12.6'. A regional location plan of Promised Land Dam is enclosed as Plate 1, Appendix E.
- c. Size Classification. Promised Land Dam has a maximum storage capacity of 5,048 acre feet and a maximum height of 16 feet. The structure is in the "Intermediate" size category.
- d. Hazard Classification. There is one state owned cabin in the valley between Promised Land Dam and Lower Lake (a distance of about ½ mile). At the present time, Promised Land State park has plans to demolish this cabin this year. There is a possibility of appreciable property damage associated with the one home on the shores of Lower Lake in the event of a dam failure. However, there is little likelihood of loss of life. Therefore, the structure is in the "Significant" hazard category.
- e. Ownership. The dam is owned and operated by the Commonwealth of Pennsylvania, Department of Environmental Resources. All correspondence should be addressed to the Department of Environmental Resources, P.O. Box 1467, Harrisburg, PA 17120.
- f. Purpose of the Dam. The purpose of the dam is to provide a recreation site for Promised Land State Park.
- g. Design and Construction History. The earliest record for Promised Land Dam is an inspection report made in November, 1919. There is no evidence that construction documents or design data prior to that date are available. According to available records, the dam at that time was an earth embankment with the downstream slope protected by riprap. The concrete spillway was a broad-crested weir located in the center of the embankment with concrete abutments.

According to information in the DER files, extensive repairs to the Promised Land Dam were made between November, 1930 and May, 1931, to correct serious defects in the structure. These defects were reported to include excessive leakage at the spillway, settlement of the embankment, inadequate spillway capacity, and a wall along the downstream slope which was about to collapse. The repairs involved the construction of a vertical reinforced concrete cut-off wall, 55 feet long and 15 inches thick, along the upstream edge of the spillway. The wall extends down to solid rock. Additional fill was placed on the upstream slope and the embankment was raised 3 feet to Elevation 1731.1. The dry stone wall on the downstream slope was reconstructed. A reinforced concrete slab was laid in the spillway and joined to the vertical cut-off wall, raising the spillway to Elevation 1726.1. Concrete abutment walls adjacent to the spillway were raised 2.5 feet to a height 5.0 feet above the spillway slab. According to correspondence in the DER files, riprap was placed on the upstream face and loose rockfill placed along the downstream toe.

In September, 1935, construction drawings for an outlet conduit for the Promised Land Dam were completed and construction began in 1936. The rectangular outlet conduit, constructed of timber and concrete, passes through the earth embankment to the left of the spillway. Flow through the conduit is controlled by means of a stop-log structure located on the upstream face of the dam.

h. Normal Operating Procedures. Under normal operating conditions, the overflow from Promised Land Lake is controlled by the spillway. Carl Rose, the Promised Land State Park foreman, stated that the outlet conduit is opened only to draw the lake down when it is necessary to repair the beaches or dock facilities.

1.3 Pertinent Data.

a. Drainage Area.

a.	Drainage Area.	
	Square Miles	6.6
b.	Discharge at Dam Site (cfs.).	
	Total spillway capacity at top of dam Elev. 1731.1	1,070
c.	Elevation (feet above MSL).	
	Spillway Crest (Normal, Recreation Pool) Top of Dam Reservoir Drain Invert (Inlet) Reservoir Drain Invert (Outlet) Apron (Estimated) Streambed at Centerline of Dam (Estimated)	1726.1 1731.1 1719.5 1719.5 1715.1
d.	Reservoir (miles).	
	Length of Normal, Recreation Pool Length of Maximum Non-overtopping Pool	1.9 2.0
e.	Storage (acre-feet).	
	Normal, Recreation Pool, Elev. 1726.1 Top of Dam at Low Point, Elev. 1731.1	2,554 5,048

f. Reservoir Surface Area (acres).

Normal, Recreation Pool, Elev. 1726.1	438
Top of Dam at Low Point, Elev. 1731.1	562

g. Dam Data

Type	Earth
Length	125 feet

Height Top Width Side Slopes Zoning Impervious Core Cutoff **Grout Curtain**

16 feet (maximum) 12 to 14 feet 3H:1V (upstream); 0.25H:1V (downstream) Not Available Not Available Concrete to rock in spillway area

Spillway

Type Concrete broad-crested weir Width 14 feet 33 feet Length Crest Elevation 1726.1 Gates None Upstream Channel Promised Land Lake Rocky channel into large Downstream Channel masonry culvert.

Outlet Works

48 inch square reinforced Type concrete conduit connected to 49 inch square timber conduit which flares to a 48 inch by 72 inch timber

conduit. Length 68 feet + Closure Stop-logs Access Concrete manhole on upstream slope of left embankment. Regulating Facilities Manual removal of stop-logs

SECTION 2

ENGINEERING DATA

2.1 Design

- a. Data Available. The information available in the DER main office files in Harrisburg, Pennsylvania, for review of Promised Land Dam includes the following:
 - Dam inspection reports beginning in 1919 and through the intervening years.
 - 2. Photographs beginning in 1921 and through the intervening years.
 - 3. "Report Upon the Promised Land Dam", Commonwealth of Pennsylvania, Department of Forests and Waters, 1929.
 - 4. "Proposed Repairs of Promised Land Dam", Commonwealth of Pennsylvania, Department of Forests and Waters, 1929, 1930.
 - 5. "Promised Land Dam Proposed Outlet Conduit", Commonwealth of Pennsylvania, Department of Forests and Waters, 1935.
 - Memorandums and correspondence between Horace H. Heller, the contractor, and the Department of Forests and Waters (October, 1930 to April, 1931).
 - 7. "Progress Report", Commonwealth of Pennsylvania, Department of Forests and Waters, 1930.
 - 8. "Final Report on the Repair of the Promised Land Dam", Commonwealth of Pennsylvania, Department of Forests and Waters, 1931.
 - Correspondence betweern Civil Conservation Corps, the contractor, and the Department of Forests and Waters (1936).
 - 10. Miscellaneous correspondence.
- b. Design Features. The design features are discussed in Section 1.2.a. The repair and additional construction drawings are shown on Plates 2, 3, and 4 of Appendix E.

2.2 Construction

Based on the field investigation and the information available in the construction reports, the dam appears to have been constructed in general conformance with the design drawings.

2.3 Operation

Operation procedures appear to be limited to those necessary to draw down the lake by removal of stop-logs located in the manhole structure on the upstream slope of the dam. There is no evidence that operating procedures have been written for this structure.

2.4 Evaluation

- a. Availability. Limited material is available concerning embankment materials and subsurface conditions. However, data is available concerning inspections and construction history.
- b. Adequacy. A Phase I evaluation is considered reasonable based on the revealing conditions observed during the field inspection and conversations with the owner's representative, although design and construction information is limited concerning embankment materials and subsurface conditions.
- c. Validity. There appears to be no reason to doubt the validity of the data available.

SECTION 3

VISUAL INSPECTION

3.1 Findings

- a. General. The field inspection of the Promised Land Dam was conducted on December 5, 1978. At the time of the inspection, water was flowing over the spillway at a depth of one to two inches. Additional water was observed flowing from the outlet conduit. No underwater areas were inspected. The observations and comment of the field inspection team are included in the checklist which is Appendix B of this report. The appearance of the facility indicates that the dam and its appurtenances are well maintained.
- b. Dam. The upstream face of the dam has a mowed grass cover and is well maintained. Randomly-sized stone has been placed into the earth above the spillway level. Several footpaths, located on the upstream face, appear well compacted and are not causing any erosion at this time. One footpath, adjacent to the right wingwall, has caused some minor erosion.

Two low areas were noted in the top of the dam. Approximately 20 feet from the right wingwall, there is a noticeable depression (3 feet by 30 feet) about 6 inches deep. On the left side, 15 feet from the left wingwall, there is a low area reported to be caused by erosion. This area, about 2 feet by 2 feet, is drained by a hole eroded into the earth embankment. The park foreman stated that this problem is the result of runoff from a parking lot adjacent to the left side of the dam. A wooden and wire mesh fence is located along the downstream side of the top of the dam.

The entire downstream face of the embankment is covered by a dry stonewall with a concrete cap. The masonry has a slight outward bulge midway up the wall across its entire length. The bulge is more apparent in the wall immediately below the low area in the top of the dam to the right of the spillway. Sparse vegetation was observed growing in the masonry wall. Roots from the large tree located at the downstream toe, at the right side of the embankment, are growing in towards the embankment material beneath the stonewall. The roots may be the principal cause of the "bulging" or "heaving" that is evident on the downstream slope near the right abutment.

A flow of water, approximately 2 gallons per minute, was observed coming from the base of the wall adjacent to the spillway on the right side of the dam. On each side of the spillway, there was an ice layer on the stonework. On the right side of the spillway, seepage through the dam was noted flowing under the ice down the masonry wall. It was not

evident that this was due to water from the spillway or seepage through the embankment on the right side. Seepage was observed on the ground surface in several areas to the right of the spillway on the downstream side of the dam. The flow from each seep area is approximately 1/4 gallon per minute and is discolored.

The approach to the spillway has silted such that sandy sediments have reached the spillway crest.

Currents may have removed the sands from a beach a few hundred yards from the spillway and deposited them at the spillway. Spalling is evident at the waterline on both wingwalls. Significant spalling, approximately 1/4 inch deep is apparent on the downstream side of the right wingwall in the spillway channel and where the wingwall contacts the stonework. Minor spalling and erosion has occurred at the downstream edge of the spillway slab, which overhangs the dry stonewall. The concrete underneath the spillway slab and above the stonework has recently been replaced during remedial work. This work included resurfacing portions of the apron slab below the spillway.

c. Appurtenant Structures. It is reported by the owner's representative that the rectangular channel below the outlet conduit has undergone recent remedial concrete work. The wall on the left side of the channel shows evidence of recent concrete patching, and the last 3 to 4 feet of the concrete channel appear to have been placed recently. The earth adjacent to the left wall of the channel has eroded in an area approximately 2 feet by 15 feet. The probable cause of this erosion is the runoff from the parking area to the left of the dam.

The stop-log structure, which controls the flow through the outlet conduit, was locked and no inspection of these facilities could be made. The water flowing from the outlet conduit may indicate that the stop-logs need replacement.

- d. Reservoir. Siltation of the reservoir was observed in the vicinity of the spillway. The slopes around the reservoir are on mild gradients and are heavily vegetated.
- e. Downstream Channel. Immediately downstream of the dam, the East Branch of Wallenpaupack Creek enters a large stone masonry culvert under Route 390. Approximately one-half mile beyond the culvert, the flow enters Lower Lake. The stream overbanks beyond the culvert are heavily vegetated. The stream channel has a gradient of approximately 0.3 percent in this area. There is one state owned cabin in the valley between Promised Land Dam and Lower Lake (a distance of one-half mile). At the present time, Promised Land State Park has plans to demolish the cabin this year. There is one home on the shores of Lower Lake. During the summer months, as many as a dozen people would be involved.

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SECTION 4

OPERATIONAL PROCEDURES

4.1 Procedures

Operational procedures appear to be limited to those necessary to draw the level of the Promised Land Lake down to perform maintenance on the park beaches and dock facilities. There is no evidence of written operating procedures. Normal operating procedures for this structure do not require a dam tender.

4.2 Maintenance of the Dam

The dam appears to be well maintained by the Promised Land State Park personnel. Maintenance inspections are conducted on a regular basis by the Park Superintendent and personnel from the Division of Completed Projects; DER records and photographs of those inspections are available. Maintenance and remedial work to date include: the replacement of masonry, concrete repair, backfill and reseeding of eroded areas of the embankment, and the removal of logs, debris, trees, and brush from the embankment and reservoir area.

4.3 Maintenance of Operating Facilities

The stop-log structure was locked and no inspection could be made. However, this appurtenance was evaluated during the regular maintenance inspections of the dam and the records and photographs of the dam include information of this structure. The records indicate that the stop-logs have been replaced when necessary.

4.4 Warning Systems in Effect

According to the Park Superintendent, no formal procedures have been established for warning downstream residents during periods of high lake levels. However, observations of high lake levels have been recorded in recent years.

4.5 Evaluation of Operational Adequacy

The current operating and maintenance procedures for the Promised Land Dam appear adequate. Operating procedures could be improved by providing for the opening of the stop-log structure during periods of high lake levels to minimize the possibility of overtopping the embankment. Presently, the stop-logs must be removed manually, which is a slow and difficult procedure.

A warning system should be developed. During periods of heavy rainfall the dam should be monitored and downstream residents alerted in the event of an impending failure.

The dam is accessible under all weather conditions for inspection and emergency action.

SECTION 5

HYDRAULICS AND HYDROLOGY

5.1 Evaluation of Features

a. Design Data. There is reported to be no original design data available. Hydraulic and hydrologic calculations accompany the "Final Report in the Repair of the Promised Land Dam" (1931). These calculations determine the capacity of the spillway after the repairs and estimate the time for the reservoir level to rise from the spillway crest to the top of the dam. The drainage area contributing to the Promised Land Dam is about 3.7 miles long and averages 1.8 miles wide. Ground elevations range from 2012 to 1726. The slopes of the reservoir watershed are all less than ten percent. The watershed is nearly 100 percent wooded.

For further information, refer to the computation, data and printouts included in Appendix C.

- b. Experience Data. There is no evidence that records of reservoir water levels have been maintained until recent years. During Hurricane Agnes, in June, 1972, the stage in the reservoir was reported to be 18 inches above the crest of the spillway. Observations during heavy rains of June 28-29, 1973, indicate that the depth of water over the spillway was approximately 12 inches. Rainfall records for Promised Land State Park are maintained at the Park Office.
- c. <u>Visual Observations</u>. On the date of the inspection, no adverse conditions were observed that would indicate the spillway capacity would be reduced during a flood. The outlet capacity of the dam could be improved by providing a lifting device to expedite the removal of the stop-logs during periods of high reservoir levels.
- of 1,070 cfs. However, the SDF for this "Intermediate" size dam, with a "Significant" hazard classification, is 50 percent of the Probable Maximum Flood (0.5 PMF), which has a peak inflow of 5,950 cfs. and a peak overflow of 1,430 cfs. The 0.5 PMF hydrograph was routed through the reservoir with the starting water surface 0.2 feet above the crest of the spillway at elevation 1726.3. The maximum water surface elevation in the reservoir resulting from the 0.5 PMF routing would be 5.5 feet above the spillway crest and 0.5 feet above the lowest point at the top of the dam.

Examination of the results of the hydrologic and hydraulic analysis indicates that the spillway is capable of passing 45 percent of the PMF without overtopping of the embankment. (See Appendix C for computations.)

e. Spillway Adequacy. Based on the results of the hydrologic and hydraulic analysis, the spillway of the Promised Land Dam is capable of handling 45 percent of the PMF while the SDF is 50 percent of the PMF. Therefore, the spillway of the Promised Land Dam is classified as "Inadequate".

SECTION 6

STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observations. Several existing conditions indicate potential embankment stability problems. The dry stone wall on the downstream face of the dam has a slight outward bulge. The bulge is more apparent on the right of the dam where a low area is evident along the top of the dam. The tree roots from the large tree located near the downstream toe, may be a principal cause of the heaving action noted on the downstream slope near the right abutment. The hole in the top of the left side of the dam indicates that runoff from the parking lot has removed portions of the earth embankment. Previous reports indicate that this is a reoccurring problem and must be corrected. The visible portion of the upstream face of the dam is in good condition.

Seepage and discolored water were observed near the downstream toe on the right side in several areas. The rate of flow from each area was estimated to 1/4 gallon per minute.

Inspection of exposed concrete work revealed that significant spalling of the concrete has occurred on the spillway. Although no reinforcing steel bars were exposed, remedial work is necessary to prevent further deterioration of the concrete.

- b. Design and Construction Data. Available documentation, calculations, and other data were reviewed. No original design data are available. Structural drawings for repairs to the dam are available; however, no structural calculations or soil data are available. Lists of design and construction data reviewed are given in Sections 2.1.a and 2.2.
- c. Operating Records. There is no evidence that operating records are maintained for the Promised Land Dam.
- d. Post-Construction Changes. The available information indicates that two major modifications to the original structure have been made. In 1930 and 1931, a vertical cut-off wall was added, the embankment was raised 3 feet, and the spillway reconstructed for the new embankment height. In 1935, the outlet conduit and stop-log structure were constructed. Design drawings for these modifications are included in Appendix E as Plates 2, 3, and 4. Information is available in the DER files on maintenance repair work done on the dam through the years.

Seismic Stability. Promised Land Dam is located within Seismic Risk Zone 1 of the "Seismic Zone Map of Contiguous States". Normally, it can be considered that if a dam in this zone is stable under static loading conditions, it can be assumed safe for any expected Zone 1 earthquake conditions.

SECTION 7

ASSESSMENT, RECOMMENDATIONS AND PROPOSED REMEDIAL MEASURES

7.1 Dam Assessment

a. Evaluation. Based on visual observations made during the date of the inspection, the dam and its appurtenant structures are considered to be in fair condition. There is a low area at the top of dam near the right abutment and bulges in the dry stone wall. Seeps exist near the downstream toe on the right side of the dam. A large (50 foot high, 24 inch diameter) tree is adjacent to the downstream toe of the dam on the right side. Riprap protection on the upstream slope is missing. Some concrete surfaces have deteriorated due to spalling.

The SDF is the 0.5 PMF. Examination of the results of the hydrologic and hydraulic analysis indicates that the spillway is capable of passing 45 percent of the PMF without overtopping the embankment. Since the spillway system is not capable of handling the SDF, it is classified as "Inadequate".

- b. Adequacy of Information. A Phase I evaluation is considered reasonable based on the revealing conditions observed during the field inspection and conversations with the owners representative, although design and construction information is limited.
- c. <u>Urgency</u>. The remedial measures recommended in Section 7.2 should be effected immediately.
- d. Necessity for Further Evaluation. Further investigations should be performed to determine the stability of the dam and the need for structural improvements. Detailed hydrologic and hydraulic studies should be made to determine the extent to which the spillway system should be increased.

7.2 Recommendations and Remedial Measures

a. Facilities.

- Detailed analyses should be initiated to determine the stability of the dam and need for structural improvements. Evaluate the significance of the seepage and the cause of discoloration of seepage downstream of the dam to the right of the spillway. The stability analyses and seepage evaluation should be perfromed by a licensed professional engineer experienced in the design and construction of dams.
- The large tree adjacent to the downstream toe of the right embankment should be cut below ground level and the hole filled and compacted.

- The parking lot should be regraded so that runoff drains away from the dam.
- 4. The stop-logs should be provided with means to facilitate their removal.
- 5. Decisions concerning the need to place riprap protection, fill settled areas, raise the top of dam, and construct additional spillway facilities should await the results of the stability analysis and further hydrologic and hydraulic studies.
- Consideration could be given to increasing the capacity of the spillway in accordance with the results of detailed hydrologic and hydraulic studies.

b. Operation and Maintenance Procedures.

- A warning system should be developed for Promised Land Dam.
 During periods of heavy rainfall or rapid snowmelt the dam should
 be monitored and downstream residents alerted in the event of an
 impending failure.
- 2. The stop-logs should be removed every 6 months to remove sediment that may have been deposited against the stop-logs in the conduit.
- 3. Until the necessary remedial work has been performed and the spillway capacity has been increased based on detailed hydraulic and hydrologic studies, lake levels should be monitored during periods of heavy rain or rapid snowmelt. If during these periods, the lake level rises rapidly, the stop-logs should be removed to minimize the possibility of overtopping the dam.

APPENDIX

Α

Check List Engineering Data

Design, Construction, Operation

Phase I

CHECK LIST ENGINEERING DATA DESIGH, CONSTRUCTION, OPERATION PHASE I

NAME OF DAM PROMISSACL LOVAL 10 # PA 0030 B

AS-GUILT DRAWINGS

REMARKS

Not Assilable.

Sheet 1 of 4

REGIONAL VICINITY MAP

Sua Plata 1, Appendix E

CONSTRUCTION HISTORY

Rodor to Sadion 1.2.9

TYPICAL SECTIONS OF DAM

Ratur to Approving E

OUTLETS - PLAN

for plan and datails

Rater to Appendix E

CONSTRAINTS

DETAILS

DISCHARGE RATINGS

RAINFALL/RESERVOIR RECORDS

Not Available

Rainfall rocords available at Promised Land State Park

Sheet 2 of 4 Ruber to Saction 2.1 REMARKS DESIGN REPORTS

Not Available, Ratur to Apparatix F of this raport GEOLOGY REPORTS

No dam stability analysis or sappage exudias Ratar to Saction 5.1 & Net Available available DESIGN COMPUTATIONS
HYDROLOGY & HYDRAULICS
UAM STABILITY
SEEPAGE STUDIES

MATERIALS INVESTIGATIONS
BORING RECORDS
LABORATORY
FIELD

Not Awilable

Not Available

POST-CONSTRUCTION SURVEYS OF DAM

BORROW SOURCES

Not Assilable

	Sheet 3 of 4
ITEM	REMARKS
MONITORING SYSTEMS	Nong
MODIFICATIONS	Rotor to castion (a.1c)
HIGH POOL RECORDS	Rator to Saction 5.1 b
POST COMSTRUCTION ENGINEERING STUDIES AND REPORTS	Inspection reports made on a ragular basis are

00

Maintenance performed and records kept on a regular basis. No operations of records a vailable.

MAINTENANCE OPERATION RECORDS

None reported

PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS

Sheet 4 of 4 Refur to Appendix E REMARKS SECT 1011S DETAILS SPILLWAY PLAN ITEM

OPERATING EQUIPMENT PLANS & DETAILS

for stopilog details

MISCELLANEOUS

Marter in the 12 files - rotor to Saction 2.1a mol 2.2

APPENDIX

В

Check List

Visual Inspection

Phase I

CHECK LIST VISUAL INSPECTION PHASE I

Sheet 1 of 11

		National
Name Dam Promissed Lanci	County PiKa State P	State Pennsylvania 10 # PA 00303
Type of Dam Earth	Hazard Category Significant	anificant
Date(s) Inspection 12/5/73	Weather Class	Temperature 80's-40's

Tailwater at Time of Inspection 1716 ± M.S.L.

Pool Elevation at Time of Inspection 1726.3 M.S.L.

Inspection Personnel:

David B. Complail Thomas C. Ahn Dana R. Pizarro David B. Jampial Grega C. Flias

Recorder

Remarks:

Carl Rosa, Promised toyof State Roth Foreman, accompanied inspection parsonal. Earth onbankning producted by dry stone wall on downstruen side

CONCRETE/MASONRY DAMS

Ó

VISUAL EXAMINATION OF	OBSERVATIONS	Sheet 2 of 11 REMARKS OR RECOMMIENDATIONS
ANY NOTICEABLE SEEPAGE	₫/z	
STRUCTURE TO ABUTMENT/ENBANKMENT JUNCTIONS	₫/2	
DRAINS	4/2	
WATER PASSAGES	±/2	
FOURDATION	t₁/?\	

CONCRETE/MASONRY DAMS

0

VISUAL EXAMINATION OF	OBSERVATIONS	Sheet of 11 REMARKS OR RECOMMENDATIONS
SURFACE CRACKS CONCRETE SURFACES	N/N	
STRUCTURAL CRACKING	t/N	
VERTICAL AND HORIZONTAL ALIGUMENT	47/N	
мэногітн эбінтѕ	₫/N	
CONSTRUCTION JOINTS	M/M	

EMBANKMENT

-

0(.

TO MOTTANIMAY OF TANISTO	ORSEDVATIONS	REMARKS OR RECOMMENDATIONS
VISUAL EXAMINATION OF	UBSERVALIUNS	ALTANAS ON NECOTIENDALIONS
SURFACE CRACKS	None Observed	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None Observed	
SLOUGHING OR EROSION OF EMBANKHENT AND ABUTMENT SLOPES	Minor prosion adjacent to werguestle, Erecton through embernesses erast on lett siele, Ereston next to lett outsit	change draineds pathern of celjaient parkingaron, Fill and resourt product arms:
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	Horizontal alignmonth-Good Vartical alignmant- 6 cm. cloprossecut off right sida aloprossecut off right sida aloprossecut arockel off latt secto of clam	Initiate boring programs to caternine composition and an side proparties of ambankmant and towndation metarcals to carlo manages in bota Indias to applicate posterior of programs and the stop open of the programs of the posterior of the programs and the stop of the programs and the stop of the programs of the programs and the programs of the progra

Place rip-rap on application of ambonkmont

Chartacac

Nove

RIPRAP FAILURES

EMBANKMENT

a;

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
DRAINS	d/2	10 Marie 1

JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	Junction of embankment and and abutument open to good condition, contact between applicant state of the two two periods	1
ANY NOTICEABLE SEEPAGE	Sooppy coming from stonowath on right side of dam at twa, soveral soopenge around becaused clounistician of twa en right side. Impergation of twa en right side. Impergation of twa en right side. Impergations	Movidor coupocy for evaluate of changes in rate of control for the city in determination of source of composition of source of composition of source of composition of source.
STAFF GAGE AND RECORDER	Apple	١

OUTLET WORKS

		Sheet 6 of 11
VISUAL EXAMINATION OF CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET COMBUIT	Totalior of poully confirm	Draws down lake so that to saving draw a granning
INTAKE STRUCTURE	Not observet, with	=
OUTLET STRUCTURE '	Wingwail on latt sida in bank bank patrixel	
OUTLET CHANNEL	Rucant concrate patehing shours about word, some flows in outlet chaminal	1
EMERGENCY GATE	stop-logs function as amaignized gate - had ploserized, markhole	enspect stop lays
BRIDGE	Woodlan fact bridge over spillway in good conclition	

UNGATED SPILLWAY

		Sheet / of 11
VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	spoiling on wingwalls at waterling significant spailing on clarate on soils at 19ht wingwall. Minor spalling at downstrawn asles et spillway skip.	Rately spelled areas.
APPROACII CHANNEL	Sandy adiment up	Ramoue sediment when lake isodiaust- down

Rocky channel to large	pulvert under Roche 200	metal slock		
DISCHARGE CHAINEL				

BRIDGE AND PIERS

Spillway in good conclition,

GATED SPILLWAY

		Sheet 8 of 11
VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE SILL	<u>4</u> 2	
APPROACH CHAINNEL	\$/a	
DISCHARGE CHANNEL	0/2	
BRIDGE AND PIERS	<u>d</u> 2	
GATES AND OPERATION	4/2	

INSTRUMENTATION

Sheet 9 of 11 REMARKS OR RECOMMENDATIONS	Install monuments on crost to observe settlement	1		Install piozometurs in embourbment, particularly on right side, to chlorming source of seups
OBSERVATIONS	Mone	Nona	Nong	Non
VISUAL EXAMINATION	MONUMENTATION/SURVEYS	OBSERVATION WELLS	WEIRS	PIEZOMETERS

OTHER

RESERVOIR

		Sheet 10 of 11
VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	Havily courred works and bruth, mild slopes	
SEDIMENTATION	sardy sadimonation to to spillusay lavel at marvall outlet, probably from board near	Romova when lake is cleann down

DOWNSTREAM CHANNEL

		Sheet 11 of 11
VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	Route 36,0 cirlust the priority of damps, 100 feet downstituted of natural etreum channel light bresh in overbonks rocky eventual	
SLOPES	mid slopas	

Lake, I private residence on tower take. Maybe a dozen beople involved during the sensition of the sensition ove state owned cabin between Promised APPROXIMATE NO. OF HOMES AND POPULATION

Devotop & implement formal warning system.

APPENDIX

С

Hydrologic & Hydraulic Data



SUBLECT BY DATE JOB NO

TABLE OF CONTENTS APPENDIX C

Hydrologic Data

Hydrograph Coefficients & PMP Calculations Stts. 1&2
Stand - Aroa, Stage - Storage Calculations Stts. 1&2
Spill bery & Emborkinshi Discharge Comp. Stts. 3&4
Route 270 Calculat Stocking Computations Stts. 5-9

HEC-I tam Safety Version Computer Output Whited Broads of Davis. 3H3.10-15

12/14/75 1941-010 DRP apper Promised Land Dam

D. A. Aroa I . Aroa II

Area I = 1.015 ch /weet x 27.75 and x 4 10 0 42 x 5.587 x 10-5

= 4.04 mil

Arma II = 1.015 1/unit x 19.53 unice x 4x10 0 x 3.507 x 10.50

= 1.84 ...

D.A = 6.80 mc = 2 6.9 mc = by planimater 6.57 mc = by reports use 6.57 mc

Hydrograph Farameters (snyder mother)

to - C+ (LLc) 0.3

Cq. 1.28 & supplied by CCE Cp 0.45) Zone 1

L = 4.1 miles

La = 1.9 mais

ερ= 1.13 ((4.1)(1.9))°.3 = 2.8 hr.

er 2.3 hr . 0.4 hr

Probable Maximum Home (PNO) (Hydromet 33)

Zone 1 (Fic. 1)

Probable Max. Hary (FMP)= 22.2 in. (200m =, 24hr)

Darth - Area - Duration Relationships

maximum 6 br = 111% PMP

Maximum 12 be : 122 % PMP Maximum 24 be = 135% PMP

Less Late

0

mitial less : 1"

uniform les octo /the

G O'BRIEN&GERE ENGINEERS

Subject Promised Land Dam 1 DRP 12/15/73 1841-010

base flow

1.5 cfs/mi2 x 6.57 mi2 = 9.9 cfs

Flogation - Area - Copacity Data

Flau.	Area (mil)	Acara (acra)
17.5.6	0.71	422.0 -data
1740	1.90	612.8 Splanimeter 1216.00
1720.4		287
1715.1 Grad	embed alou)	extension et date

BE O'BRIEN & GERE

PLD

0

DEP 1/19/79 1841-010

Extend Elowation-Area-Capacity Data balow spillway crost using conic method

V= 765,000,000 gallons at Elev 1725.6 A: 422 acros A = 18,382,32042 h= 1725.6 - 1715.1 (Hountedalev) = 10.5 A+ 2V= 102,272,727 ct - 1347 aure- ft

r= 11/1 = 118,382,32042/1 = 2418.34

V= 17 (2415,9)2 (105) = 64, 335,954 of (single cove)

break into a cones 1) assume area at 1/2 is 1/2 area of 17

appro Cone Volume: (5.25) (422 + 211 + (422)(211) = 1629.9 acre-# = 71,000,000 cf

Botham Come Volume: Mrig = A 1 11 (5.25): 569.3 avect = 16,000,000 F

> Total. 87,000,000 ct too low

(2) assume area at 1/2 is 55% area of by

Upper Come Volume = (5.25 (422 + 231 + 1(422)(232)

- 1692 ac-4 = 73,700,000 at

Potlom cone Volume : 1724 (232) (5.25). 406 ac. 4

= 17,700,000 c+

Total = 91,400,000 too low

OBRIEN & GERE

PLD | SMEET BY DEP 1/18/79 1841-010

3) assume aroa at 1/2 is 65% aroa at 17

upper cone Volume = (525) (422+274+ (122)(274))

= 1813 ac. 4-79,000,000 ct

Bottom Cone Volume (5.25) (274) = 479.5 ac. At
= 20,900,000 ct

Total = 99,900,000 ct

(4) assume arou at 1/2 is 68% area ety

Volunce = (2.23) (422 + 2(237) + 1(422)(257))

= 2343 ac-4 = 102,004,000 et good

OBRIEN S GERE

Upper Provided Land Dame 3 DRP 12/18/79 1841-010

Pew. 4/15/79

Spillway Discharge Rading

Q= CLH3/2

broad crested weir (trapozoidal section)

B= 14 th (width of writ)

C= 5.1 (Brater & king)

Reduce L for abulment effects, no piers

L= L'-2 (NKp+Ka) Ha (Dasign of Small Dams, 1977)

N=O (no piers) Ka= O. 2 Hea H

L - 33-0.4-H

andonkmentaleu= 1731,1

Q= 3.1 LH3/L

H(a)	L(a)	Q (545)	WSEL 1726.8 1727.6	
0.7	32.7	5°)	1726.8	
1.5	32.4	185	1727.6	
3.0	31.8	512	1729.1	
4.5	31.2	923	1730.6	
5,0	31.0	1074	1731.1	

Embankment Discharge Rating

0

Q: CLH 1/2 broadensted wir (trapszeidal)
B: 12+14 4

C = 3.1

Flow 1731 L=140-33-1074
17346 L=160-33-127

1740 L: 560

OBRIEN 5 GERE

SUBJECT DOF	Promised	Land Dam	SHEET 4	DRP	12/20/75	1341-010
					4/15/19	

Hair	Livin	Quoir	Howk.	Lamb	Quil	Quair - Que	Ebu.	
Ħ .	31	1074	0	0	0	1074	1731.1	
4.5	31	1593	15	116	661	2254	1732.6	
8	31	2174	3.0	124	1997	4171	1734.1	
9,5	31	2814	4.5	170	5030	7844	1735.6	

G O'BRIEN&GERE

Upper Promise Land Dam 5 DRP 12/19/73 1841:010

Rea 350 Bridge

Tocorrect downstream of dams

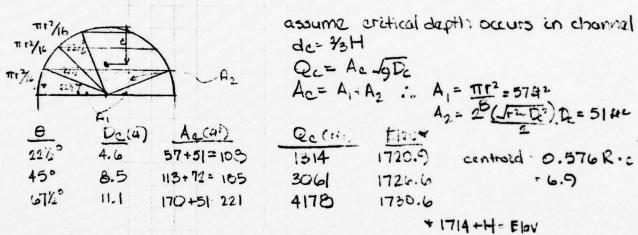
ovald act as a constant structure

to 1 = road approx 1733, bottom of cultural approx 1714

somicurcular approx 7=12

crown alow= 1726

Haadwater Balan Crown (Open Carril How)



Hoadwater Above Crawn H/D +0.75
assume well rounded inlet Ce-1, Ke: O (morrist wiggert)

$$Q = A \int 2g \left(H + \frac{Va^{2}}{2g}\right)$$

$$A = 126.14$$

$$A = 12$$

8.9 0.75 5415 1728

0

O'BRIEN&GERE ENGINEERS

Subject Upper Promised Land Dam SHEET BY DRA 12/19/25 1841-010

Headwater Above crown, H/D > 1+

+ For 0.75 2 4/D21 oscillating, hoods occur, producing stug flow the curve will be interpolated in this region.

$$Q = A \int \frac{2g \left(H + \frac{V_0^2}{2g} + S_{bL}\right)}{1 + f \left(\frac{L}{D}\right)} = \frac{1}{5.65}$$

$$f \left(\frac{L}{D}\right) \approx \frac{29.1 \, \Omega^2 L}{12^{4/3}} = \frac{29.1 \, (.025)^2 (3\omega)}{5.65} = 0.12$$

$$\frac{V_0^2}{2g} \approx 0 \qquad 5bL \approx 0$$

$$Q = A \int \frac{20H}{1.12}$$

$$\frac{H_0}{1.12} = \frac{H_0}{1.12} = \frac{Q(c+\frac{L}{D})}{1.12} = \frac{E_0 U}{1.12}$$

$$\frac{H_0}{1.12} = \frac{Q(c+\frac{L}{D})}{1.12} = \frac{E_0 U}{1.12}$$

$$\frac{H_0}{1.12} = \frac{H_0}{1.12} = \frac{Q(c+\frac{L}{D})}{1.12} = \frac{E_0 U}{1.12}$$

$$\frac{H_0}{1.12} = \frac{Q(c+\frac{L}{D})}{1.12} = \frac{E_0 U}{1.12}$$

$$\frac{H_0}{1.12} = \frac{Q(c+\frac{L}{D})}{1.12} = \frac{Q(c+\frac{L}{D})}{1.12} = \frac{Q(c+\frac{L}{D})}{1.12}$$

$$\frac{H_0}{1.12} = \frac{Q(c+\frac{L}{D})}{1.12} = \frac{Q(c+\frac{L}{D})}{1.$$

occurs, see following page for computations

weir langth is somethed to be 504 at 1733
is approx. 200 it 1740
" " " " 800 at 1760

OBRIEN S GERE

Subject
Upper Admized Land Dam

SHEET BY DEF 12/20/75 JOB NO 12/20/75 1841-010

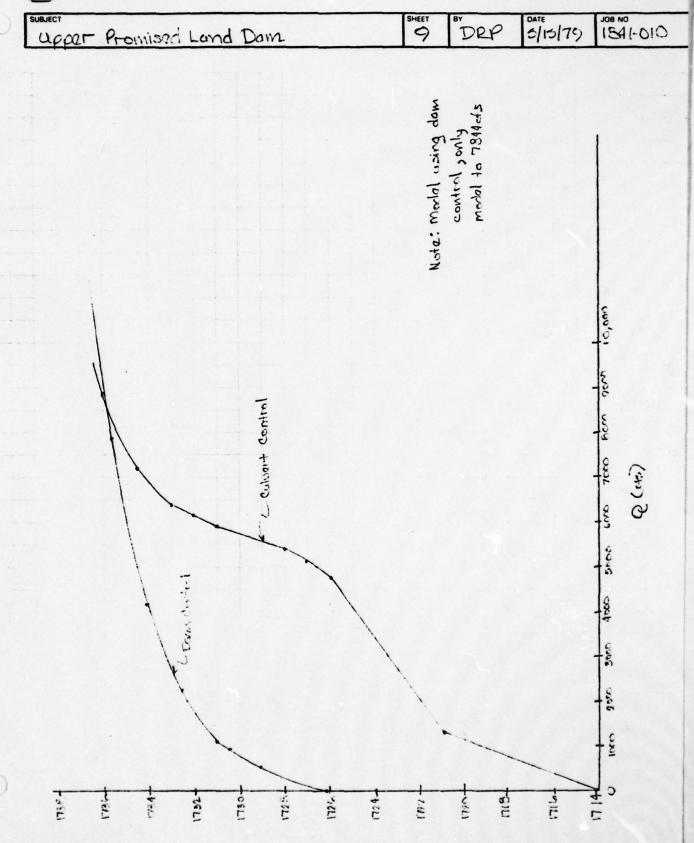
 $\frac{H_{p} > 13.9}{H_{p} (A)^{+}} = \frac{P_{resourc} How}{Q_{p}(A)^{-}} = \frac{H_{w} = H_{p} - 13.9}{1.5} = \frac{L}{82} = \frac{Q_{p} + Q_{w}}{467} = \frac{E100}{7196} = \frac{1734.5}{16.9} = \frac{10.9}{7051} = \frac{3.0}{3.0} = \frac{114}{1836} = \frac{1836}{8587} = \frac{1736.0}{1736.0}$

+ assumes reservoir lovel over entities

Combined Discharge Rating Curve for Route 370 Bidge

Elou.	Q(de)
1714.0	0
1720.9	1314
172 leiC	4768
1727,0	5102.
1728.0	5415
1731.0	5916
1732.Q	6160
1733.0	6395
1734.5	7198
17:4.0	8857





		1		1.0			-									1735.6	7844				
	•	•		6.0					0.05				ND LAKE		7	1734.1	4171				
DERAM	LAND.PA	•		8.0	-	LAND LAF			1.0			-	MISED LA		-1726.3	1732.6	2254				
TION PR	PROMISED	•		0.7		SOMISED	0						DER PRO			1731.1	1074	1216	1760		
NATIONAL DAM INSPECTION PROGRAM	PROMISED LAND DAM.PROMISED LAND.PA.	•		9.0		SUNDER TO UPPER PROMISED LAND LAKE	0	133					POUTING THROUGH UPPER PROMISED LAND LAKE	-		1730.6	923	812.8	17.0		
TONAL DA	MISED LA	•		9.0		NOFF TO		123					UTING TH	-		1729.1	512	460.8	1727		
MAN	Cad	30	-	4.0		7	6.57	111			~		à			1727.6	165	422	1725.6		
		•	•	0.3	A.		-	25.25		0.45	05	A2				1726.8	65	287	1720.4		
	42	н 150	61	71 0.5	0		-	0		. 2.3	x -1.5	-	K1		11 1	Y41726.1	15 0	0 VS	\$£1715.1	\$\$1726.1	111731.1
-	~ ~	• •	0 0	1		•	10		12	13	:	15	16	11	18	1.5	50	21	25	23	54

FLOOD HYDROGRAPH PACKAGE (MEC-1)
ALST MODIFICATION 25 SEP 78
ALST MODIFICATION 25 SEP 78

AUN DATE 06/06/79.

NATIONAL DAM INSPECTION PROGRAM PROMISED LAND.PA. PASHOMISED LAND.PA.

HARRISON ACT

2 0 0

MULTI-PLAN ANALYSES TO BE PERFORMED NPLAN= 1 NRTIO= 9 LRTIO= 1 S= .20 .30 .40 .50 .60 .70 .80 .90 1

SUR-AREA RUNOFF COMPUTATION

•

.....

RUNDEF TO UPPER PROMISED LAND LAKE

ISTAO ICOMP IECON TIAPE JPLT JPRT INAME ISTAGE IAUTO

INVOG TUMG TAREA SWAP TASDA THSPC RATTO JSNOW JSAMF LOCAL 1 6.57 0.00 6.57 0.00 0.000 0 1

0.00 SPFE PMS RO RIZ 024
TH-PC COMPUTED BY THE PROGRAM IS .800

STRTG: -1.50 ORCSN: -.05 RT108: 2.00

43 END-OF-PERIOD ONDINATES, LAG" 2.30 HOURS, CPs. 45 VOL" 1.00
523. 736. 813. 759. 664. 581. 588.
298. 260. 226. 199. 174. 151. 133.
78. 68. 60. 52. 46. 40. 35.
51. 18. 16. 16. 14. 12. 11. 9.

0 400 HO.DA HR.MN PERIOD RAIN EXCS LOSS COMP O HO.DA MR.MN PERIOD RAIN EXCS LOSS

0 (

SUM 23.62 21.76 1.80 180666. SP. 12

						1735.60	7644.00									
			IAUTO			1734.10	4171.00									
:			ISTAGE	LSTE	STOR4 SPRAT	1732.60	2254.00				FXPL 0.0					
i			INAME		ST084											
		LAND LA	1897	dad!	0.000 0.000 0.000 -17261	1731.10	1074.00	1216.	31281.	1760.	COOL CAREA	EXPO DAMITO				
:	DUTTNG	PROMISE	JPL 3	1 1001	00.0	1730.60	923.00	A13.		•0•	FLEVL	COOT EXP				
	HYDROGRAPH ROUTING	ROUTING THROUGH UPPFE PROMISED LAND LAKE	ISTAG ICOMP IECON ITAPE UPLT UPRI INAME ISTAGE	IRES ISAME	LAG AMSK?	1729.10 1730.60	512.00	.61.	2957, 11178.	1727. 1740. 1760.	COOM EXPN FLEVL	5				
	AH	TING THR	1 1 1 1	00.0								TOPEL 1731.1	Sar	Sen	S S	
		BOR	STA0 10	00000	NSTPS NSTOL	1727.60	185.00	*55.	2339.	1726.	CIAdS 0.0		419. AT TIME 26.00 HOURS	682. AT TIME 26.00 HOURS	953. AT TIME 26.00 HOURS	
			•	0.00		1726.80	89.00	287.	507.	1720.	CREL 1726.1		AT 11ME	AT TIME	AT TIME	
							00.0	•	:	1715.			.19.	682.	983.	
•						STAGE 1726.10		SURFACE AREA=	CAPACITYE	ELEVATION:			51 ac 7	20 IS	13v 15	
						STAGE	FL0.	SURFACE	45	ELEV			PEAK OUTFL DW 15	PEAK OUTFL De 15	PEAK OUTFLING IS	

2623. AT TIME 24.00 HOURS

PEAK OUTFLEW 15

1977. AT TIME 24.50 HOURS

1425. AT TIME 25.00 HOURS

PEAK OUTTING IS

PEAK OUTFING 15

3339. AT TIME 23,50 HOURS

PEAK OUIFLOW IS 4627. AT TIME 23.00 HOURS

0

PEAK OUTFLOW 19 5449. AT TIME 22.00 HOURS

•

•

,

OPERATION STATION		PLAN	RATTO 1	PATIO 2	AREA PLAN RATIO 1 PATIO 2 RATIO 5 RATIO 6 HATIO 7 RATIO 9 .50 .50 .50 .70 .70 .90 .90 1.00	RATIO 4	PATTO S	8AT10 6	. 017AH	4 01148	1.00	
TA HAMBORDA AT	6.57	-	2380.	3571.	1 2360. 3571. 4761. 5951. 7141. 8332. 9522. 10712. 11902. (67.41)(101.11)(134.62)(168.52)(207.27)(235.93)(269.63)(303.33)(337.00)	5951.	7141.	235.931	9522.	303.331	337.003	
ANUTED TO A2	17.02)	-	11.88)(19.321	1 419, 682, 953, 1425, 1977, 2623, 3339, 4027, 5449, (111,88)(19,32)(26,98)(40,35)(56,00)(74,28)(94,56)(114,03)(154,29)	1425.	56.001	74.281	3339.	114.03)	154.29	

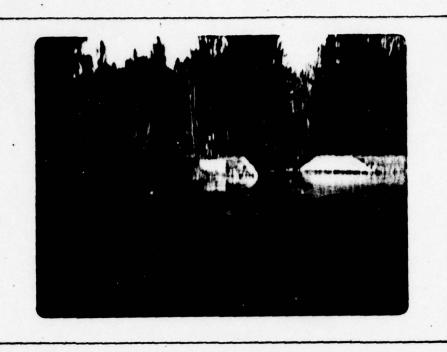
SUMMARY OF DAM SAFFTY ANALYSIS

	Time of	HOURS	0.00	00.0	00.0	00.0	0.00	00.0	00.0	00.0	00.0
1731 - 10 SOAM 1731 - 10 SO46 - 1074 -	11 v 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	HOURS	26.00	26.00	26.00	25.00	24.50	24.00	23.50	23.00	22.00
	DURATION TOB	HOURS	0.00	00.0	00.0	00.6	14.00	17.00	19.00	20.50	21.50
SPILLWAY CREST 1726.10 2554.	MAXIMUM	CFS	.19.	682.	953.	1425.	1977.	2623.	3339.	4027.	5449.
	MAK THUM	AC-FT	3762.	4299.	4825.	5301.	5710.	6096.	6439.	6778	6988.
INITIAL VALUE 1726.30 2641. 17.	4471404	OVER DAM	00.0	00.0	00.0	54.	1.15	1.79	2,35	2.89	3.21
ELEVATION STORAGE DUTFLOR	HAKIMUM	W.S.ELEV	1728.08	1729.72	1730.70	1731.55	1732.25	1732.89	1733.45	1733.99	1734.31
	84710	1	.20	.30	04.	.50	09.	.70	68.	06.	1.00
PLAN 1											

APPENDIX

D

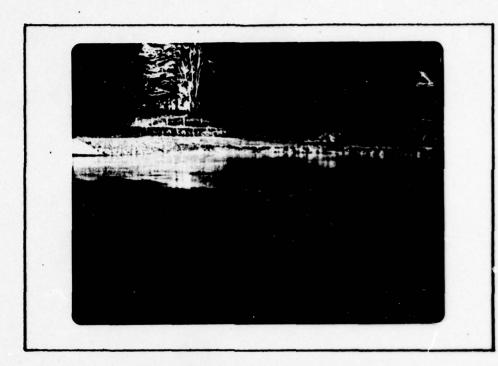
Photographs



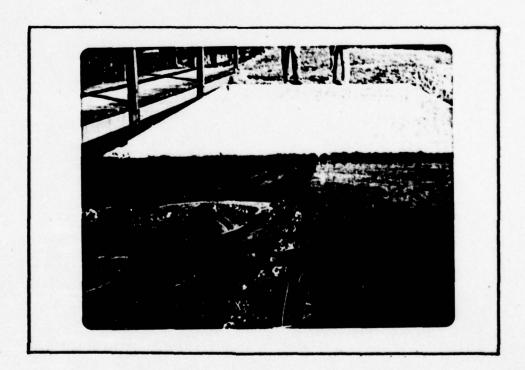
UPSTREAM FACE OF DAM LOOKING TOWARDS THE SPILL WAY



LEFT ABUTMENT OF THE UNSTREAM FACE OF THE DAM



RIGHT ABUTMENT OF THE UPSTREAM FACE OF THE DAM



VIEW OF THE SPILLWAY SHOWING SPALLING ON THE RIGHT SIDEWALL



(0)

VIEW OF THE RESERVOIR FROM THE RIBHT SIDE OF THE DAM LOOKING UPSTREAM



EROSION ALONG THE RIGHT WINGWALL OF THE SPILLWAY LOOK-ING DOWNSTREAM



DOWNSTREAM FACE AND TOE AT THE RIGHT SIDE OF THE DAM



CHANNEL DOWNSTREAM OF THE DAM SHOWING THE CULVERT UNDER STATE ROUTE 390



VIEW OF THE OUTLET CONDUIT

APPENDIX

E

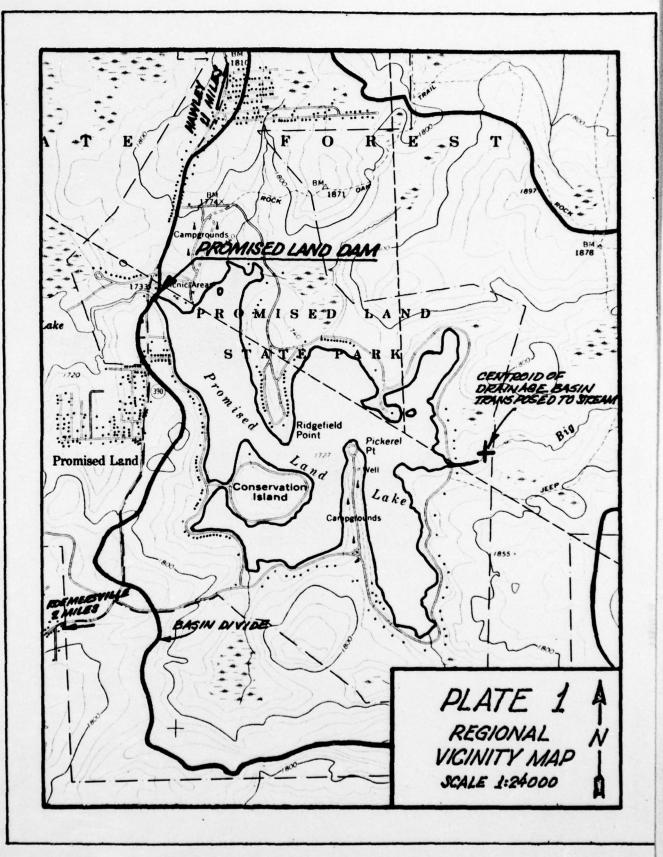
Drawings



Provided Land Dam

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(6)

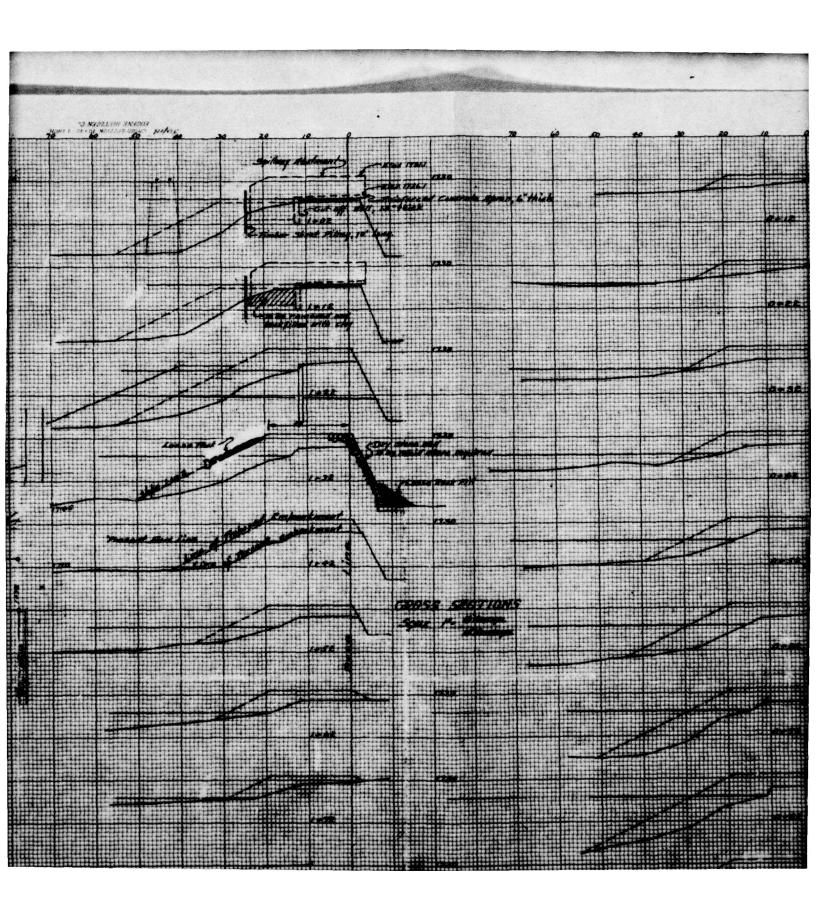


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PROMISED LAND DAM PROPOSED REPAIRS

PINE COUNTY PENNA.

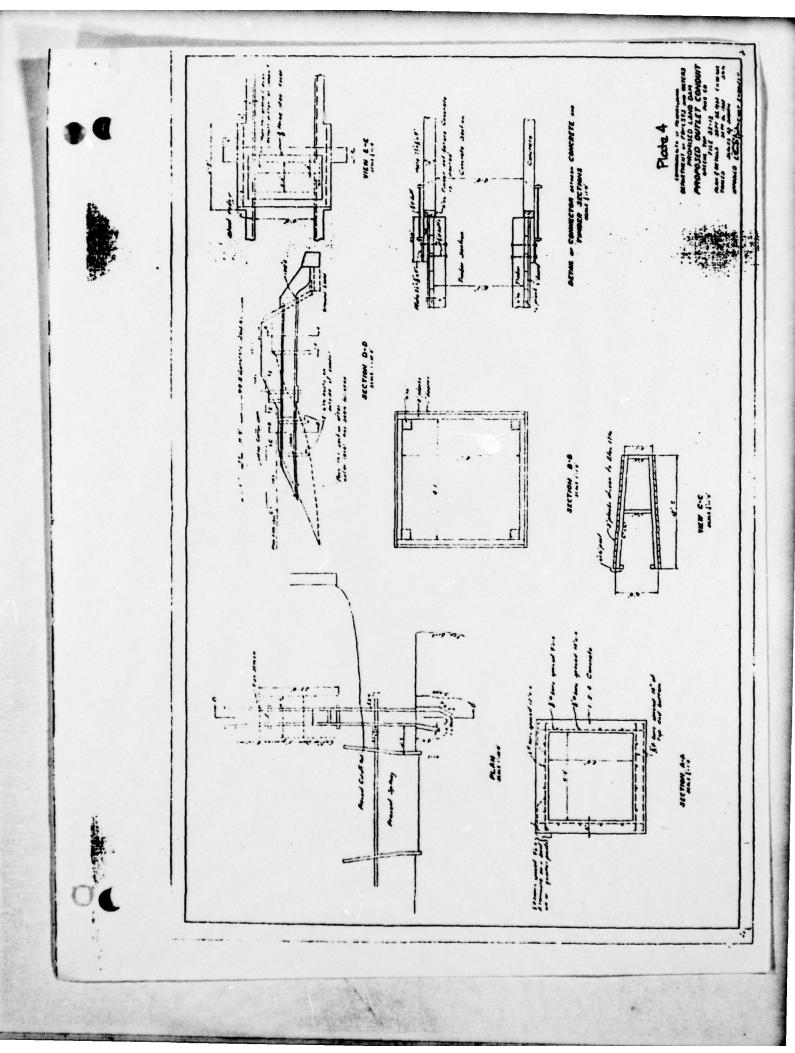
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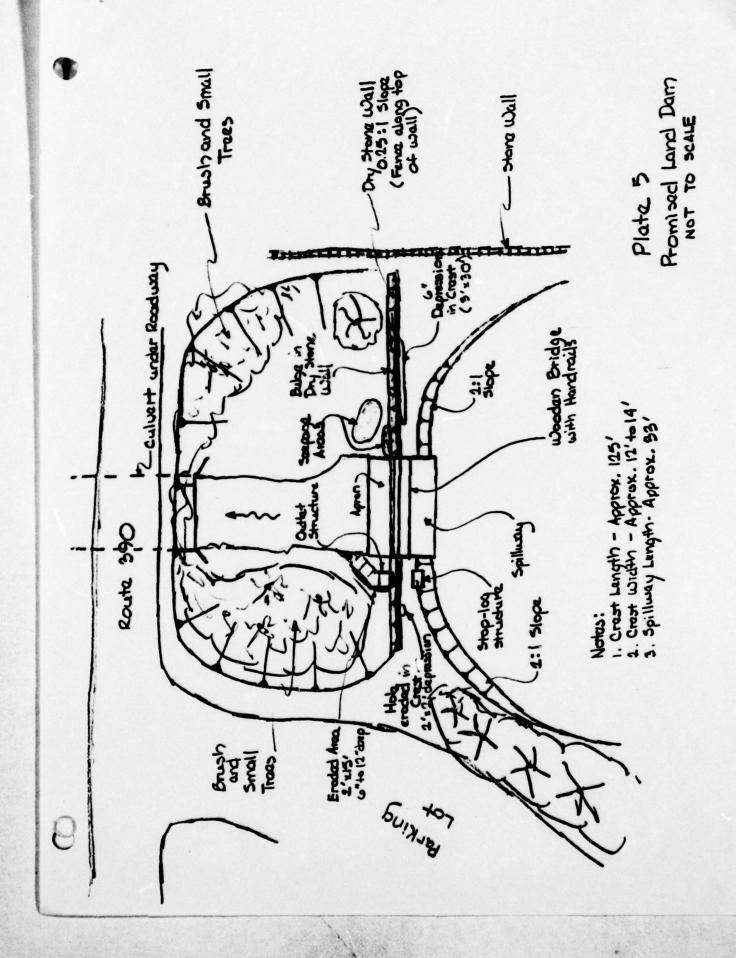


OF THE SECTION OF THE 072E

3

A TANKA





APPENDIX

F

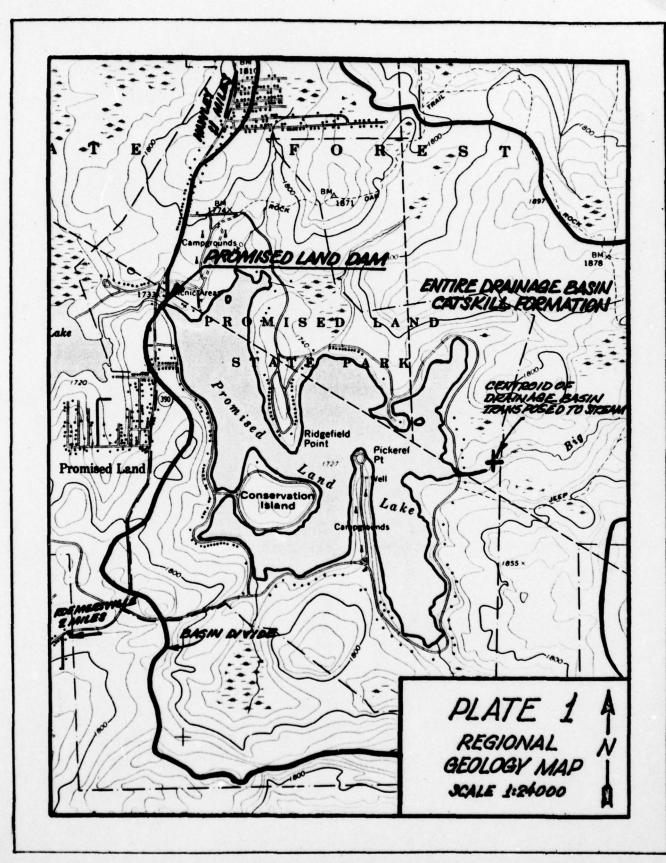
Site Geology

SITE GEOLOGY

PROMISED LAND DAM

Promised Land Dam is situated in Pike County and within the limits of the Eastern Glaciated section of the Appalachian Plateau physiographic province. Thick deposits of glacially derived debris and till cover the nearly horizontally bedded, red, gray and green shale and sandstone units of the Devonian Catskill group of marine and continental sediments. The dam and lake both rest on glacial till and ground moraine deposits which are dense, compact and relatively impermeable. Prior to construction of the lake the area was covered with high valley swamps and bogs, attesting somewhat to the compactness and impervious nature of the dense, glacial till mantle.

No known faults or major structural defects occur in the bedrock in the vicinity of the dam and lake.



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